

Remarks

The Applicants have amended Claim 1 to include the subject matter of Claims 8 and 9. Claim 1 has further been amended to recite that the member for resin injection communicates with a groove formed on the intermediate member. Support for that amendment may be found in the Applicants' originally filed specification in paragraphs [0082] as well as Fig. 8 of the drawings. Claims 8 and 9 have accordingly been cancelled.

Claim 50 has been amended to include the subject matter of Claims 57 and 58. Also, Claim 50 has been amended to recite that the member for resin injection communicates with a groove formed on the intermediate member. Support is the same as mentioned above with respect to the Claim 1.

Claims 57 and 58 have accordingly been cancelled.

Claim 59 has been amended to change "injecting" to "injects" for clarification purposes.

Entry of the above amendments and cancellations into the official file is respectfully requested.

Claim 59 stands objected to with respect to verb inconsistency. As noted above, the Applicants have amended Claim 59 by changing the verbiage so that the language is consistent now within the claim. Withdrawal of the rejection is respectfully requested.

Claims 1, 5, 7-9, 13, 16, 17-19, 50-54, 56-58, 62, 65 and 66-69 stand rejected under 35 USC §103 over the hypothetical combination of Advandi and Loving with Sekido. The Applicants respectfully submit that the rejection is now moot with respect to cancelled Claims 8, 9, 57 and 58. The Applicants also respectfully submit that the hypothetical combination fails to disclose, teach or suggest the subject matter of Claims 1, 5, 7, 13, 16, 17-19, 50-54, 56, 62, 65 and 66-69. Reasons are set forth below.

The rejection frankly acknowledges that Sekido does not disclose a method or apparatus wherein an intermediate member having grooves for resin paths formed on its surface and through holes communicating with said grooves extending to the fiber substrate and a groove which extends substantially over the entire circumference of said reinforcing fiber substrate. The Applicants agree. Thus, the rejection turns to Advani and Loving to cure those deficiencies. The Applicants respectfully submit, however, that even if one skilled in the art were to make the hypothetical combination, the apparatus and methodology resulting from that hypothetical

combination would still be different from Claims 1, 5, 7, 13, 16, 17-19, 50-54, 56, 62, 65 and 66-69. Advani discloses that a resin injection groove (fluid delivery channels: 122, 222, etc.) is provided on the plate. However, column 3, lines 1-5 discloses that a groove for gas discharge (a second set of channels: 124, 224, etc.) is also provided on the same surface of the plate, and it is used to discharge as or resin. Thus, the subject matter of Advani relates to a mechanism wherein the hole provided in the groove of the plate is opened/closed using a mechanical piston (the gate control system: 150) via a deformable sheet (deformable member: 140).

However, even if the plate disclosed in Advani is applied to the RTM mold of Sekido, it cannot vacuum evacuate the inside of the cavity because of the presence of the groove for gas discharge (a second set of channels: 124, 224, etc.). Further, even if resin is injected from the resin injection groove (fluid delivery channels: 122, 222, etc.), by a difference between flow resistances, resin is not sufficiently impregnated into the reinforcing fiber substrate and there is a danger that the resin is discharged to the groove for gas discharge (a second set of channels: 124, 224, etc.) at a short cut condition.

Therefore, even if Sekido and Advani are combined, it is still not possible to produce a resin molded material with no non-impregnated portions such as that achieved by the Applicants. In that regard, the Applicants have clarified that the member for resin injection communicating with the groove for resin injection is fixed on one surface of the intermediate plate formed with “only” the groove for resin injection, and on the other surface on which the groove for resin injection is not formed, namely, on the surface of the reinforcing fiber substrate disposition side, the member for resin discharge is fixed. This clarification shows that the resin can be impregnated into the reinforcing fiber substrate vacuum evacuated in advance, almost simultaneously from the resin path extending through and in the thickness direction, without occurrence of a resin non-delivered region as described in the Applicants’ originally filed specification in paragraphs [0067] and [0084].

On the other hand, if one skilled in the art were to apply Advani to the Applicants’ apparatus or that of Sekido, because Advani does not provide a vacuum evacuation, if the vacuum evacuation is carried out from the groove for gas discharge (a second set of channels: 124, 224, etc.), as shown in Fig. 5B, it would be reasonable to expect that the deformable sheet

(deformable member: 140) could likely close the hole provided in the groove of the plate by the vacuum pressure.

The Applicants respectfully submit that Loving fails to cure the deficiencies set forth above with respect to Sekido and Advani. Thus, the resulting methodology and apparatus would be different and that apparatus would still be unable to produce a resin molded material with no non-impregnated portions as achieved by the Applicants. Withdrawal of the rejection is respectfully requested.

Claims 14, 15, 63 and 64 stand rejected under 35 USC §103 over the further hypothetical combination of Waldrop with Loving, Advani and Sekido. The Applicants respectfully submit that Waldrop fails to cure the deficiencies set forth above with respect to the two secondary and primary references. Withdrawal of the rejection is respectfully requested.

Claims 20-23 stand rejected under 35 USC §103 over the further hypothetical combination of Freitas with Loving, Advani and Sekido. The Applicants respectfully submit that Freitas fails to provide additional disclosure that would cure the deficiencies of Loving, Advani and Sekido. Withdrawal of the rejection is respectfully requested.

Claims 10 and 59 stand rejected under 35 USC §103 over the hypothetical combination of Loving, Oki and Johnson with Sekido. The Applicants respectfully submit, however, that even if one skilled in the art were to make the hypothetical combination, the result of that combination would still be different from the subject matter of independent Claims 10 and 59. Reasons are set forth below.

The Applicants set the clearance of the groove in a particularly narrow range (0.5 to 1 mm as claimed) and provide many holes on the intermediate plate. The flow resistance of the holes becomes quite large and most of the resin flows into the clearance of the groove. As a result, an unexpected advantage is obtained wherein, after the resin is delivered over the whole of the reinforcing fiber substrate in its plane direction, the resin is impregnated in the thickness direction "almost simultaneously" as discussed in the Applicants' specification in paragraph [0085].

In Oki, a groove is provided on a mold to supply the resin to the substrate positioned at the back side (the mold side) of the preform formed as a sandwich structure. There is only a description that the resin is impregnated into the substrate via the resin distribution medium. The

Applicants, on the other hand, set the clearance of the groove in a particularly narrow range (0.5-1 mm) such that the flow resistance of the holes provided on the intermediate plate becomes quite large and most of the resin flows into the clearance of the groove. As a result, an unexpected advantage is exhibited wherein, after the resin is delivered over the whole of the reinforcing fiber substrate in its plane direction, the resin is impregnated in the thickness direction “almost simultaneously.” However, Oki, merely describes that it is preferred that the width of a groove to be formed on the mold is in a range of 0.5-5 mm and the depth thereof is in a range of 0.5-20 mm (paragraphs [0028] and [0029]). Oki neither describes nor suggests how the injected resin is delivered and impregnated in the plane direction and in the thickness direction.

In Johnson, there is only a description that a space (chamber) 16 is formed between bagging film 3 and perforated film 4. This perforated film 4 is considered to be the resin distribution medium used in Oki and Johnson neither describes nor suggests how the injected resin is delivered and impregnated in the plane direction and in the thickness direction.

Loving merely describes an apparatus wherein a groove is provided around the reinforcing fiber substrate and a uniform vacuum evacuation is achieved from the entire circumference. Loving neither describes nor suggests how the injected resin is delivered and impregnated in the plane direction and in the thickness direction.

Therefore, even if Loving, Oki and Johnson are combined with Sekido, the result does not provide an explanation as to wherein, after the resin is delivered over the whole of the reinforcing fiber substrate in its plane direction, the resin is impregnated in the thickness direction “almost simultaneously.” Withdrawal of the rejection is respectfully requested.

With respect to Loving, the rejection states that the groove capable of vacuum evacuating the whole of the reinforcing fiber substrate uniformly is provided around the reinforcing fiber substrate and that the tube for vacuum evacuation and the groove are formed on the lower mold present at a side opposite to the resin injection side. However, the intermediate plate of Advani cannot vacuum evacuate because a groove for discharge (vent gas) is provided at the resin injection side, and molding cannot be performed because a short cut to the groove for discharge occurs by a difference in flow resistance.

Even if the reinforcing fiber substrate is vacuum evacuated uniformly from the entire circumference by providing a groove such as that of Loving on the lower mold, in the case where an intermediate plate such as that of Advani is applied, essentially the vacuum evacuation cannot be performed. Therefore, even if the description of Loving is added, the result of the combination with Advani and Sekido is different from the Applicants' Claims 1 and 50. Withdrawal of the rejection is respectfully requested.

In light of the foregoing, the Applicants respectfully submit that the entire application is now in condition for allowance, which is respectfully requested.

Respectfully submitted,



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